THE CLAIMS

What is claimed is:

1. A golf ball comprising:

a core; and

a cover layer comprising a curing agent and a polyurethane prepolymer formed from a polyisocyanate and a monodisperse telechelic polyol having a polydispersity of from about 1.0 to about 1.3, and having the formula:

$$T—Z_n—C—Y—C—Z_n—T$$

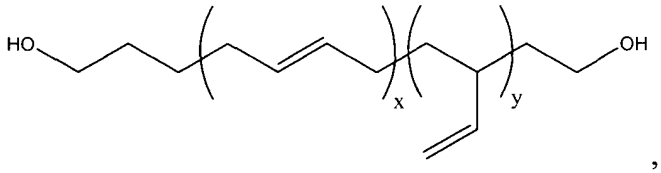
where **Y** is at least one molecule or mixtures of molecules having at least two independently polymerized vinyl groups, such as 1,3-divinylbenzene or 1,4-divinylbenzene;

C is a hydrogenated or unsaturated block derived by anionic polymerization of at least one monomer selected from the group consisting of conjugated dienes, alkenyl-substituted aromatics, and mixtures thereof;

$\mathbf{Z_n}$ is a branched or straight chain hydrocarbon connecting group which contains **n** = 1-50 carbon atoms; and

T is hydroxyl.

2. The golf ball of claim 1, wherein the monodisperse telechelic polyol comprises



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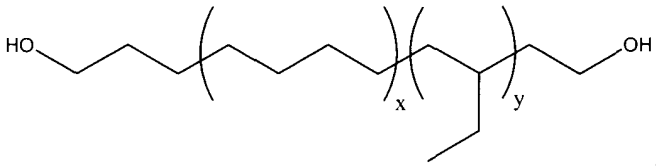

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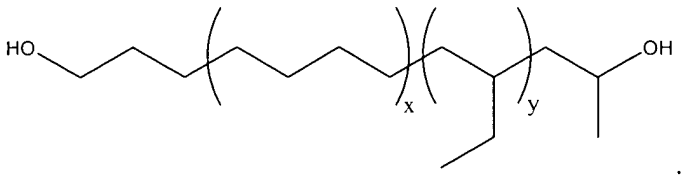

3. The golf ball of claim 1, wherein the core comprises a polybutadiene composition and the salt of a halogenated thiophenol.

4. The golf ball of claim 3, wherein the salt of a halogenated thiophenol comprises the zinc salt of pentachlorothiophenol.

5. The golf ball of claim 1, wherein the polyisocyanate comprises toluene diisocyanate; 4,4'-diphenylmethane diisocyanate; polymeric 4,4'-diphenylmethane diisocyanate; carbodiimide-modified 4,4'-diphenylmethane diisocyanate; 3,3'-dimethyldiphenyl-4,4' diisocyanate; naphthalene diisocyanate; *p*-phenylene diisocyanate; xylene diisocyanate; *p*-tetramethylxylene diisocyanate; *m*-tetramethylxylene diisocyanate; ethylene diisocyanate; propylene-1,2-diisocyanate; tetramethylene-1,4-diisocyanate; cyclohexyl diisocyanate; 1,6-hexamethylene-diisocyanate; dodecane-1,12-diisocyanate; cyclobutane-1,3-diisocyanate; cyclohexane-1,3-diisocyanate; cyclohexane-1,4-diisocyanate; 1-isocyanato-3,3,5-trimethyl-5-isocyanatomethylcyclohexane; isophorone diisocyanate; methyl cyclohexylene diisocyanate; triisocyanate of 1,6-hexamethylene-diisocyanate; triisocyanate of 2,2,4-trimethyl-1,6-hexane diisocyanate; triisocyanate of 2,4,4-trimethyl-1,6-hexane diisocyanate; 4,4'-dicyclohexylmethane diisocyanate; or trimethylhexamethylene diisocyanate.

6. The golf ball of claim 1, wherein the monodisperse telechelic polyol has a polydispersity of from about 1.0 to about 1.1.

7. The golf ball of claim 1, wherein the cover has a thickness of less than about 0.05 inches and the core has a compression of between about 50 and about 90.

8. The golf ball of claim 1, wherein the core outer diameter is between about 1.50 inches and about 1.62 inches.

9. The golf ball of claim 1, wherein the golf ball has a coefficient of restitution of greater than about 0.8.

10. The golf ball of claim 1, wherein the golf ball has a coefficient of restitution of greater than about 0.81.

11. The golf ball of claim 1, wherein **C** comprises hydrogenated isoprene having a peak molecular weight of from about 500 to about 350,000.

12. The golf ball of claim 1, wherein the core comprises a center and an outer core layer.

13. A golf ball comprising:

a core;

an intermediate layer; and

a cover comprising a curing agent and a polyurethane prepolymer formed from a polyisocyanate and a monodisperse telechelic polyol having a polydispersity of between about 1.0 and about 1.3, and having the formula:

$$T—Z_n—C—Y—C—Z_n—T$$

where **Y** is at least one molecule or mixtures of molecules having at least two independently polymerized vinyl groups, such as 1,3-divinylbenzene or 1,4-divinylbenzene;

C is a hydrogenated or unsaturated block derived by anionic polymerization of at least one monomer selected from the group consisting of conjugated dienes, alkenyl-substituted aromatics, and mixtures thereof;

$\mathbf{Z_n}$ is a branched or straight chain hydrocarbon connecting group which contains **n** = 1-50 carbon atoms; and

T is hydroxyl.

14. The golf ball of claim 13, wherein the intermediate layer is an inner cover layer, an outer core layer, or a water vapor barrier layer.

15. The golf ball of claim 13, wherein the intermediate layer is an inner cover layer, and the inner cover layer and the cover each have a thickness of less than about 0.05 inches.

16. The golf ball of claim 13, wherein the intermediate layer comprises the monodisperse telechelic polyol or a monodisperse telechelic polyurea.

17. The golf ball of claim 13, wherein the intermediate layer comprises ionomers, vinyl resins; polyolefins; polyurethanes; polyureas; polyamides; polycarbonates; acrylic resins; thermoplastics; polyphenylene oxides; thermoplastic polyesters; thermoplastic rubbers; or highly-neutralized polymers.

18. The golf ball of claim 13, wherein **C** comprises hydrogenated isoprene having a peak molecular weight of from about 500 to about 350,000.

19. The golf ball of claim 13, wherein the monodisperse telechelic polyol has a polydispersity of from about 1.0 to about 1.1.

20. A golf ball comprising:

a core;

an intermediate layer; and

a cover;

wherein at least one of the intermediate layer or the cover comprises a curing agent and a polyurethane prepolymer formed from a polyisocyanate and a monodisperse telechelic polyol having a polydispersity of between about 1.0 and about 1.3.

21. The golf ball of claim 20, wherein the intermediate layer is a water vapor barrier layer and having a thickness of from about 0.1 μm to about 75 μm.

22. The golf ball of claim 20, wherein the monodisperse telechelic polyol has a polydispersity of between about 1.0 and about 1.1.

23. The golf ball of claim 20, wherein the core has an outer diameter of no greater than about 1.62 inches.

24. The golf ball of claim 20, wherein the intermediate layer is an inner cover layer having a hardness of between about 40 and about 75 Shore D; and the cover is an outer cover layer having a hardness of between about 30 and about 60 Shore D.

25. The golf ball of claim 24, wherein the inner cover layer has a flexural modulus of between about 30,000 and about 80,000 psi and the cover has a flexural modulus of between about 10,000 and about 30,000 psi.